

VALUE ADDED TEACHERS: THE LEGACY OF EDUCATIONAL TECHNOLOGY COACHES

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ABSTRACT

When helping teachers integrate iPads in their teaching, a grounded theory-based qualitative case study underpinned by the TPACK and SAMR models (Drennan, 2018), found educational technology coaches (ETC) followed an underlying principle of changing teachers' pedagogy. In implementing this principle, ETCs adopted one of four approaches through which teachers' pedagogy could change, depending on teachers' technological competence and confidence. They were: re-imagining change; slowly changing; radically changing; and co-operatively changing. Furthermore, the approaches adopted by the educational technology coaches demonstrated four concomitant behaviours, namely: meeting teachers' needs; knowledge of applications; collegiality; and modelling desired behaviour. The three hallmarks of the legacy of their success were all exhibited by teachers not educational technology coaches. These were posited as teachers' increased iPad integration vision; an escalation in collegial sharing of their improved technological confidence and competence; and a critical mass of "uncoached" teachers asking for help. A figurative model showing this is presented. In conclusion, there are distinct pedagogical advantages to having dedicated ETCs implement iPad integration. These must be balanced against the few disadvantages. Caution is sounded against generalizing these findings to include Android devices, especially with regard to possible non-compatible interfaces of a variety of devices in one classroom.

KEYWORDS

Educational Technology Coach, iPads, Integration, Pedagogy

1. INTRODUCTION

In the decade since the introduction of tablet computers some research has focused on their affordances. Godsk (2013), for example, listed the affordances of iPads. Android tablets, Blackberry Playbooks and HP Touchpads without differentiating between them. Other research has focused on how they were used in the classroom by teachers. Haßler, Major and Hennessy (2015, p. 16) found support for teachers using "transformative pedagogical models" regardless of tablet brand. Many studies considered iPads specifically (See Heinrich, 2012, Lane, 2012, Cochrane, 2013, Karsenti, 2013 and Reed 2013). A Bring-Your-Own-Device (BYOD) classroom, can present teachers and students with multiple incompatible interfaces. Research in these classrooms might obfuscate findings unnecessarily. Classrooms with single brand tablets, such as iPads, would ensure better device management and classroom workflow with few technical issues as all apps work on all devices.

However, Nguyen, Barton and Nguyen (2014) decried the paucity of literature on how teachers' pedagogy changed. Valstad and Rydland (2010) bemoaned leaving the iPad integration decision to individual teachers. Drennan (2018) sought clarity in this under-researched area through a grounded theory-based qualitative case study underpinned by the TPACK and SAMR models. She researched the relationship between ETCs and teachers in five South African private schools all constituted under one brand and sharing one campus: a junior preparatory; a girls' preparatory; a girls' college; a boys' preparatory; and a boy's college. She found single device use, the iPad, ensured better device management and workflow with few technical issues as all apps worked on all ETC, teacher and student devices. She argued that the technological capabilities of the iPad created technological affordances that could lead to new pedagogical affordances. She found ETCs used these to drive pedagogical change.

Teacher pedagogy and classroom power dynamics changed when ETCs helped teachers integrate iPads. Teachers were no longer knowledge and resource gatekeepers. Classroom power dynamics were transformed

through more active student engagement. Everything teachers could access or do through the iPad, so could students, making classroom democratisation and learning transparency more possible. Drennan (2018) proposed an emerging model of an ETC to describe their work and its impact on teachers, students and parents, as neither they nor principals may have the time or technological experience to discover, implement or assess new technology or pedagogy. She concluded ETCs used four general approaches when following the underlying principle of changing teacher pedagogy, each dependent on the technological confidence and competence of the teacher. Regardless of approach, ETCs demonstrated four distinct behaviours. Their legacy was revealed through three changes in teacher behaviour.

The title ETC was in use but is misleading. There is no uniformly accepted title, but more appropriate ones include Digital Learning Specialist, Digital Integration Specialist, and Technology Integrator. The ETCs in the study were all teachers with a well-developed interest in educational computer usage, rather than Information Technology (IT) personnel attempting pedagogical relevance. The position of an ETC is a recent one within South African schools. There are no official guidelines as to their qualifications, job description or curriculum. It is hoped the model might give education stakeholders some understanding of the work done by teachers appointed as ETCs, contextualise the work ETCs do with teachers and highlight the role of ETCs as change agents.

2. THE FOUR APPROACHES ETCs USE IN FOLLOWING THE PRINCIPLE OF CHANGING TEACHERS' PEDAGOGY

All the ETCs followed one underlying principle: changing teachers' pedagogy. Drennan (2018) found ETCs adopted one of four approaches to doing so. These are not necessarily progressive as they depend on the ETC-teacher relationship and the teacher's technological confidence and competence. They are: re-imagining changing; slowly changing; radically changing; and co-operatively changing pedagogy.

2.1 Re-Imagining Changing Pedagogy

The approach of re-imagining changing pedagogy was used when ETCs helped teachers integrate iPads in a small way. This was exemplified when a current ETC, then a Grade 2 teacher, helped her first-year intern take her class while she attended an all-day training course. They found a library book, developed questions based on its story and created a Kahoot! quiz. The intern read the story aloud before students completed the quiz on school-owned iPads. Then students physically painted the main character with paint and paper, not digitally on the iPad. The teacher never advocated doing everything on the iPad as her young students are still developing gross and fine motor co-ordination, concluding, *"We just need to do little things but we can integrate effectively"*. She would often make iPads with extension literacy, numeracy or problem solving games, available to students who had completed class work. Unsurprisingly, the intern wanted to continue improving her iPad integration skills and the teacher was redeployed as a full-time ETC.

2.2 Slowly Changing Pedagogy

ETCs worked at a slower pace with new-to-the-iPad teachers, or the technologically resistant or insecure, who might fear appearing incompetent to students. ETCs wanted them to slowly change pedagogy by helping them integrate iPads into one topic or series of lessons. For example, instead of teacher-talk about the voting system with students completing worksheets, an ETC helped a Grade 6 teacher achieve the same end through students using iPads. The students shouldered greater responsibility, within a well-defined rubric, than previously. In groups, some wrote campaign speeches, designed posters, video-interviewed people, or filmed a candidate-promoting advert. Each had a voice and choice. The teacher found this deeper, more authentic student engagement enriched their learning and the final product than was the case previously.

Another ETC showed a highly technologically resistant Grade 5 teacher how to change a disliked topic, rock types, into a more exciting one by creating student buy-in and allowing student development of learning material. The Decide Now! app was used to randomly assign rock types to student groups, satisfying them that the decision was uncoupled from possible teacher favouritism. Students researched their rock type online. They compiled textual and pictorial material in a Book Creator book and videoed themselves singing about their rock type to song lyrics they had adapted. All this material was uploaded into a Book Creator book. Each book was then consolidated into one comprehensive Book Creator book that all students could

access as their learning material for the topic. The teacher assessed the work when it was presented, rather than paging through or carrying heavy notebooks. This was a major pedagogic change, as students were active creators of their digital learning material, rather than passive consumers only. Moreover, all students were exposed to everyone else's work and notes were never lost. Increased confidence empowered this teacher to frame challenges as growth, thereafter developing into a confident and competent iPad integrator and later becoming an ETC.

2.3 Radically Changing Pedagogy

ETCs can work quickly with confident and bold teachers. Radically changing pedagogy involved good ETC-teacher co-operation, teacher technological confidence, and an appropriate app. An ETC helped a technologically confident Drama Head of Department (HoD) put her term's work, film study, onto Google Classroom, where her agenda aligned well with iMovie capabilities. It was predicated on 'sweded movies' from the film, "Be Kind, Rewind." Grouped students chose roles, such as director or editor, before shooting two scenes from any film, but without any budget. This authentic task replaced teacher-talk. The HoD confirmed students learnt more about film making than previous classes had and enjoyed themselves. The ETC-teacher co-operation was outstanding, maturing teacher and student competencies.

Another ETC helped a deputy principal create an iTunes U course for a challenging section of Grade 6 Mathematics. For the first time she found students finished the test early and attained excellent results. Students informed her they read the explanations and watched the videos until they understood the concepts. She only teaches it that way now. This might be one way of overcoming the industrial era model of schooling where one teacher in one classroom presents one lesson at one time only. Students who are reluctant to show their lack of understanding in class can review digital material privately until they understand it.

2.4 Co-operatively Changing Pedagogy

Co-operatively changing pedagogy, usually within a department, succeeds irrespective of individual teachers' technological competencies. When all members of a department use an app, teacher learning is expedited through group discussions and self-reflective practices about pedagogic and technical issues. It also helps when extant material is uploaded. For example, the Afrikaans department uploaded their audio-visual presentations of poems and related questions. They added audio of the teachers reading them. Learners were offered a recapitulation of teaching previously limited to one lesson. Now they heard the pronunciation, intonation, cadence, rhythm and stress patterns in their teacher's familiar voice, with text simultaneously available, whenever they chose. This is particularly valuable when lesson time is the only exposure to the language. Learners can repeat access material when and as many times as needed.

ETCs would use the most appropriate approach to changing teachers' pedagogy depending on the technological confidence and competence of the teachers. Regardless of approach, they all exhibited four concomitant behaviours in their interactions.

3. THE FOUR CONCOMITANT BEHAVIOURS ETCS EXHIBIT

ETCs followed the principle of changing teachers' pedagogy by demonstrating four concomitant behaviours in their interactions. These are meeting teachers' needs; knowledge of applications; collegiality; and modelling desired behaviour.

3.1 Meeting Teachers' Needs

ETCs developed respectful and trustworthy relationships with technophobes and technophiles. They let teachers dictate the timing and pace of their interactions. Often this revealed an inverse correlation. The less confident and competent teachers were, the more time ETCs spent with them. The more confident and competent teachers were, the less time ETCs spent with them. All teachers appreciated ETC help as it freed them to concentrate on their students. The subject content knowledge of ETCs facilitated tailor-made solutions to pedagogical needs. One ETC used iMovie to meet three departments' content needs differently: voice-over adverts; make-up tutorials; and meiosis stop-motions. Another demonstrated three apps for flipping classrooms. Also, inter-departmental co-operation allowed one task to meet assessment criteria from both departments. Further, academic support teachers found value in adopting or adapting legal, online material.

Teachers appreciated the benefits of asynchronicity. Assignment time and date stamping strengthened student deadline adherence. Feedback loops with revisions and repeat submissions yielded timeous teacher intervention, deeper feedback, earlier completion and quicker marking turnarounds, especially with voice-recorded comments. Those students who pretended to have lost their work soon learnt responsibility when the history button disproved their claims.

Drennan (2018) categorised teachers into four, broad levels of iPad integration. Progression from the second to third levels seemed to happen when teachers began to use personal devices and not school-owned ones. First level teachers had never used iPads. One twenty-year teaching veteran, but new-to-the-college teacher, allowed observation of his first ETC session. His opening statement, *"I know nothing"*, drew an immediate ETC response, *"Never be afraid of touching."* ETCs focused on how individual teachers wanted to learn, not on how they thought teachers should learn. When teachers were first-time iPad users, ETCs gave, or teachers took, notes, both to reduce the initial cognitive load of learning iPad and app functionality and integration in the first sessions, and to increase their confidence when teaching students or sharing with colleagues. As teachers' experience and experimentation grew, their notes became irrelevant.

Second level teachers had used iPads sporadically, perhaps to email cricket results, but not for teaching purposes. One isiZulu teacher wrote instructions on his PC for students to complete on their iPads, stating, *"I wouldn't use a device for that."* The ETC showed him apps that allowed work to be distributed, submitted and assessed through one device. It also meant he could assess work as soon as students submitted it instead of waiting until all students had submitted work. Furthermore, he could do typed, written or spoken individual feedback quickly and easily.

Third level teachers had used a personal iPad for some years, personally and professionally. One teacher confirmed she always had her iPad with her. She used apps for school email, reading fiction, looking at Pinterest, attending gym and taking school magazine photographs, especially those capturing students' expressions when they were fully involved during her Life Science practicals. These teachers were not dependent on being taught solely by the ETC. Apart from asking colleagues for help, they asked their own eager children, sometimes learning new ways of achieving the same ends. Their students also gave help enthusiastically, often to acclaim from classmates. Teachers do not have to know everything about the technology to integrate it successfully. Regardless of student technological competence, often confined to social media apps, the teacher remains the pedagogical expert. Ironically, when teachers show technological vulnerability student respect often increases.

Fourth level teachers had used an iPad for many years, personally and professionally. One Grade 5 teacher had worked with the ETC for eight years, at two different schools. She used Mail, Keynote, iMovie, iTunes U, Edmodo, Nearpod and Google Classroom. When introduced to Apple Classroom and Clips in the observed session, she grasped their functionality integration immediately. She began to suggest lesson plans for integrating Clips in various subjects. As an experienced teacher she knew where students would struggle and how the app would supersede teacher talk and worksheets. These teachers learn quickly and comprehensively because of their knowledge and experience. They also see integration possibilities in newly demonstrated apps, without necessarily needing ETC elaboration.

3.2 Knowledge of Applications

ETCs need in-depth knowledge of different apps. They must trial and recommend apps, make decisions on purchasing them and be able to demonstrate different app features. This enables them to respond specifically to teachers' needs.

One ETC had trialled over 400 apps. Experience showed a smaller suite of multifunctional or creative apps, rather than content specific apps, were applicable in any subject area with students of any age. A second ETC suggested an isiZulu teacher use a multifunctional, editable Book Creator template to send vocabulary words, with his uploaded pronunciations, to students. They would find and upload appropriate images, then write sentences using the words, finally submitting their work for assessment. This contrasts with a content specific app such as SpellBoard, whose fun and innovative features help students practise spelling only. A third ETC suggested students make short Clips videos of their working out Mathematical problems before sharing them with the teacher. A fourth suggested students combine apps, for instance by making a Clips video on gym equipment usage then linking them to a Quick Response code stuck onto each piece of equipment. These examples show how willing ETCs are to keep up-to-date and how committed they are to investigate thoroughly which apps would be most suitable for particular teachers. It also enables them to offer different solutions to the same problem and to reveal different ways of using one app.

With purchasing decisions, it is best if ETCs give teacher, student and parent stakeholders a list of required apps at the beginning of the year or term. If done extemporaneously, it appears disorganised and unprofessional and can result in a loss of confidence in ETC expertise. Some free apps have the more powerful and productive aspects subject to in-app purchasing. This can frustrate teachers into abandoning their implementation plans. Usually, ETCs can find alternatives to expensive apps. They know that pedagogy trumps technology as, to paraphrase Rockman, it's not what you have, but what you do with it that counts (Cuban, 1993).

Especially when demonstrating to iPad-new teachers, ETCs started with what teachers know and what they want to achieve. They sat next to teachers and demonstrated on their iPad with teachers simultaneously practising on theirs. An ETC showed one teacher the iPad basics and then demonstrated Popplet while linking it to the familiar concepts of mind maps and spider diagrams. He understood and drew his own Popplet on the economic cycle, asking questions as he did so. She demonstrated how Apple TV would enable him to draw a Popplet facing the class, see immediately when students needed individual attention and could later export the Popplet to student devices. When ETCs explain app features, giving teachers opportunities to practice using them, teachers understand the benefits and implications and are more likely to integrate the app into their teaching. This is important for apps such as iTunes U and Apple Classroom that drive classroom workflow and iPad management.

3.3 Collegiality

Firstly, collegiality involved ETCs teaching or demonstrating to teachers within grades and departments, and across both. They found whole staff teaching ineffective; those who knew nothing got lost and those who knew something got bored. Neither ETCs nor teachers wanted to teach or learn this way. Interacting with groups already professionally constituted worked exceptionally well as teachers were used to sharing readily with close colleagues working in the same grade or subject.

Secondly, ETCs shared with colleagues and teachers outside of school. This is particularly vital for schools with one ETC. The benefits of belonging to a professional learning network should enable them to discuss new trends, share best practices and problem-solve common challenges, or they risk becoming irrelevant. One person can never know everything in their field. Especially in a field that continuously updates itself, ETCs must keep abreast of international trends.

Thirdly, ETCs work symbiotically. There was a high degree of co-operation and support particularly between the two college ETCs. They occasionally team-taught and pooled resources such as their individual cache of small Ozobot robots used to learn coding. Further, one preparatory and one college ETC shared the library office. To the benefits of students from both schools, if one was unavailable, then the other would help teachers, students or parents. This help ranged from pedagogical questions about aspects of app functionality, to asking for different app suggestions about meeting a task's requirements. It also included help in connecting new devices to the network or tracking a misplaced iPad (both IT support jobs).

Fourthly, collegiality extended to ETCs advising parents on boundaries for device security, student safety and schoolwork monitoring. Improved communication resulted in greater parental confidence in teachers. Children occasionally improved their parents' technological skills.

Fifthly, collegiality involved ETCs conducting their own professional development, often learning iteratively with teachers. They shared weekly with all the ETCs in an in-house professional learning network. Additionally, they met fortnightly with the executive principal and IT manager. These meetings had three functions: to give input into the role ETCs play within the school; to give and get support for integration challenges; and to share best practice. One ETC cannot be an ETC and a teacher and an IT support person, as the ETC role will be neglected in favour of the latter, especially in those with strong IT backgrounds. Clear job descriptions and boundaries for each role should be shared with all stakeholders; otherwise ETCs risk combating IT fires instead of stoking pedagogical ones. Further, they learnt from peers outside of school through attending or presenting at workshops, from colleagues on Twitter and through webinars and reflective blogging. Two ETCs were also Apple Distinguished Educators (ADE) whose global community actively shares online and meets yearly to discuss best practice and ideas.

3.4 Modeling Desired Behaviour

ETC behaviour must align with the norms and standards of the school and the teaching profession. It is the role of the principal to see this happens. ETCs model the behaviour they want teachers to model to students. One ETC admitted to a teacher, *"I don't know. I'll get back to you."* They learnt willingly from teachers and

students. Seeing this behaviour in practice made it easier for teachers to ask students for help. Another ETC, knowing the importance of all teachers manifesting acceptable academic conduct, always referenced her sources in her presentations. When teachers follow suit, it is easier for referencing to become an embedded student practice and for plagiarism to decrease.

A third ETC had discussed some dangers associated with social media use and given examples of her social media practice, particularly with regard to posting photos of her children. These newly aware students talked to their parents about doing more to keep them safe. Some asked parents to remove certain photos of their children from their timelines. The parents thanked the ETC for modeling legally compliant and ethical behavior professionally and personally.

ETCs challenged teachers to experiment then report back. In turn, they encouraged students to ask peers for help before teachers, knowing well the value of having to understand something before explaining it. Peers also offer an alternative perspective and way of explaining. Moreover, this increased independence, buy-in, flexibility, creativity and metacognition. Teachers further encouraged students to learn-by-doing, for example, by analysing a novel's characters and an app's functionality simultaneously. Then, instead of handwriting diary entries students created Tallagami animated videos of a monologue delivered by one character. Before reading set-works, other students watched pertinent music videos, or interviewed grandparents involved in wars, to give a more textured sense of time and place, strengthening emotional connections to the material. Sometimes students were instructed to decide for themselves what information was important and how to present it. This engendered critical thought, academic responsibility and authentic integration as skills were taught in context. However, sometimes student technological ability outstripped their ethical development, as when they went through Virtual Private Networks to download web material illegally.

4. THE THREE HALLMARKS OF THE LEGACY OF SUCCESSFUL EDUCATIONAL TECHNOLOGY COACHES

The four behaviours discussed above generally manifest within the privacy of an office or classroom, making it difficult to assess ETC success. However, there are three hallmarks of their success. Their legacy is exhibited by the changed behaviour of teachers. They are vision, escalation and critical mass.

4.1 Vision

The first hallmark of ETC success was teacher vision. This arose when teachers saw the possibilities for using the iPad as one tool in their repertoire and discussed their ideas with the ETC. They have caught the vision of changed pedagogy through iPad integration that previously only the ETC held. The iPad never replaces teachers, but, initially under ETC guidance, teachers began to know when the use of an iPad or app would be appropriate.

4.2 Escalation

The second hallmark was escalation. This occurred when a teacher the ETC had helped then helped others, whether teachers, students or parents. As it came from a trusted person it was more easily adopted; it was a targeted intervention that did not waste time; and had the potential to satisfy individual, specific needs. It is unlikely that the ETC would be able to help every teacher or student with every integration query, so peer teaching began to have a multiplier effect. Technological uptake might be uneven across a group of teachers so ETCs value collegial help in raising the standard of iPad integration across subjects or grades. This is especially helpful when teachers resist the approaches of the ETC, especially if there have been failed technological implementations in the past.

4.3 Critical Mass

The third hallmark was critical mass. When “unreached” or “uncoached” teachers asked for ETC help, this increased opportunities for ETC interventions. More importantly, it signalled the reach and impact of ETC work. Furthermore, it was a tacit acknowledgement of the traction iPad implementation was gaining amongst

teachers. More teachers were beginning to see iPads as an embedded, ubiquitous technology, not an artificial addenda to their teaching.

In essence, these three hallmarks show that the realisation of the underlying principle of the emerging model of an ETC has been realised: discovering how the teacher wants the iPad or app to change his or her pedagogy for the better. When ETCs based their work on this principle, four concomitant behaviours flowed from it and multiple benefits began to accrue to stakeholders.

5. FIGURATIVE REPRESENTATION OF A MODEL OF AN EDUCATIONAL TECHNOLOGY COACH

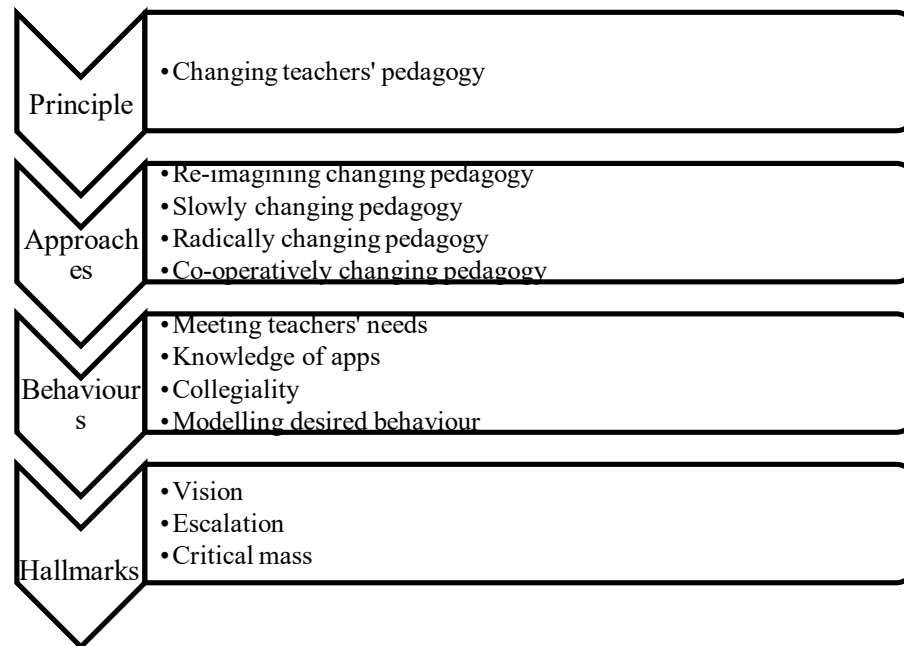


Figure 1. Figurative representation of a model of an educational technology coach

6. CONCLUSION

There are many distinct pedagogical advantages to having dedicated ETCs integrate iPads. However, these must be balanced against the few limitations. It may be possible to apply these findings to include Android devices, but this must be approached with caution.

6.1 Advantages

The first advantage of a dedicated ETC was the quicker, more comprehensive and deeper integration of iPads. This was especially pertinent when schools supplied iPads to teachers, whether or not they recouped some or all of the outlay. Additionally, appropriate, ubiquitous implementation became the norm. This circumvented technology used for its own sake as a checklist add-on to single or principal-observed lessons. Then, increased teacher and student competence and confidence led some to share new apps or ideas for implementation, having done the initial investigation themselves, with ETCs, colleagues or peers. Also, where the iPad was used to distribute, submit and assess work, there was greater teacher-student communication, as many teachers reported students contacting them with queries they were reluctant to voice in class. Moreover, when teachers allowed repeated submissions after ongoing teacher feedback the students adhered to the instructions or rubric more closely, with the final product being of a higher standard. Further, teachers reported students going beyond the brief when they had responsibility for their learning and its demonstration, especially when self-interest led to creative exploration and skill development.

6.2 Limitations

One limitation is the possible loss of a specialist subject or grade teacher to allow the appointment of a dedicated ETC. All schools have budgets with competing demands. Another salary increases the dilemma of using available resources to maximum effect. However, if the school has invested in providing the necessary technological infrastructure, it might be used to best effect when an ETC is appointed to help teachers integrate iPads. Another disadvantage is the initial cost to schools or staff when purchasing devices. This can be mitigated if iPads are distributed over a few years and if teachers contribute towards part of the cost. It is further lessened to a great extent by the pre-loaded suite of iPad apps that make immediate work possible without the need to further purchase and install basic apps.

6.3 Possible Applications

The research under discussion involved iPads. There might be scope to investigate Android devices to see if the same conclusions hold. One of the strengths of using iPads is the seamless co-operation between the operating system and the applications. This might not hold true for android devices where software glitches might frustrate users, as well as slow or stop technological integration and stifle pedagogical change. Moreover, devices from different manufacturers may have non-compatible interfaces, again decreasing opportunities for integration and change, especially if the teacher's device differs from that of any student. A BYOD situation makes the distribution, submission and marking of work near impossible.

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